Harold St. John.

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JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 27. July, 1925. No. 319.

OXALIS CORNICULATA AND ITS RELATIVES IN NORTH AMERICA.

K. M. Wiegand.

The taxonomy of the yellow flowered species of Oxalis has long been unsatisfactory and confused. Briefly summarized, the history of these plants is as follows. Linnaeus in 1753[1] described *O. corniculata* and *O. stricta*. *O. corniculata* was identified by subsequent European authors as the creeping plant of the Old World with which the name is now associated in Europe. *O. stricta* was early interpreted by European authors as the common cymose-flowered species of both Europe and America. In 1794 and 1796 Salisbury[2] proposed some new names for members of this group. One of these, *O. ambigua*, was for the plant known as *O. stricta*, another, *O. pusilla*, was plainly *O. corniculata*, and the third, *O. florida* will be discussed under that species. In the same year, however, Jacquin[3] proposed the name *O. ambigua* for a South African species, and since at present it is not possible to state which author proposed his name first, it is necessary to drop the name *O. ambigua* altogether. Also in 1794 Jacquin[4] described *O. Dillenii* "patria Carolina," based on the "O. lutea americana humilior" of Dillenius. In 1854 Jordan[5] suggested that the European *O. stricta*, so called, was not the *O. stricta* of Linnaeus, and proposed the name *O. europaea* for the plant. No definite description was given by Jordan and no definite synonyms except "(*stricta* auct.)," but there was a long running comment. However, the name has generally been considered to have been validly published.

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[1] Sp. Pl. 435.

[2] Trans. Linn. Soc. ii. 242, (1794). Prodr. Stirp. Hort. All. 322 (1796).

[3] Oxal. 80 (1794).

[4] Oxal. l. c.

[5] In Schultz, Arch. Fl. Franc. et Allem 309 (1854).

In America before 1896 the name *O. stricta* was generally applied to the plant that bore that name in Europe; but *O. corniculata* was employed to cover both the creeping plant, our *O. corniculata,* and the erect or sub-erect one with strigose stems, our *O. stricta.* Only some of the early botanists, as for instance Elliott, clearly separated these two last mentioned plants. Trelease[1] in his treatment of the genus called the creeping form *O. corniculata* and the erect form var. *Dillenii.* In 1896 Small[2] first clearly showed that the name *O. stricta* must be applied to the erect strigose reflexed-fruited plant, as it was based on a Gronovian reference which in turn was based on a Clayton specimen now in the British Museum, and which is clearly this plant. To the plant until this time called *O. stricta* he gave the name *O. cymosa.* In 1906 Dr. B. L. Robinson[3] interpreted the Linnaean names somewhat differently. He held that the name *O. corniculata* should be applied to the cymose-flowered loosely hairy species called by Small *O. cymosa,* that the name *O. stricta* should be applied to the species to which Small had already ascribed it, while the name *O. repens* Thunb. should be employed for the creeping species heretofore called *O. corniculata.* This disposition of the names was followed in the seventh edition of Gray's Manual. In 1907 Schinz and Thellung[4] discussed the application of these names and decided in favor of the usage of the older authors, a position to which in the same year Britten and Rendle[5] took exception. In 1915 Wilmott[6] pointed out that according to his view Robinson's method of determining the Linnaean types was not in accord with the best practice, and that the name *O. corniculata* should be based on the cited figure of Morison, which represented the creeping plant. The question of which viewpoint is correct, that of Robinson or that of Wilmott, is very difficult to decide. Most of Linnaeus's references and the locality given very strongly suggest the creeping species. The opening statement might apply to either, while a specimen in the Hortus Cliffortianus herbarium is *O. europaea.* In view of the difficulty of making a correct decision it has seemed best to follow the interpretation of the earlier and most of the later authors, thus avoiding a change of name. On this basis the name *O. corniculata* should be applied to the creeping species.

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[1] Mem. Bost. Soc. Nat. Hist. iv. 86 (1888), and Gray's Synopt. Fl. i. 365 (1897).

[2] Bull. Torr. Bot. Club xxiii. 265 (1896).

[3] Jour. Bot. xliv 386 (1906).

[4] Bull. Herb. Bois. 2 ser. vii 509–512 (1907).

[5] Jour. Bot. lxv. 436 (1907).

[6] Jour. Bot. liii. 172 (1915).

The earliest valid name for the plant called by Robinson *O. corniculata,* by early European authors *O. stricta,* and by Small *O. cymosa* seems to have been *O. europaea* Jordan as pointed out by Fernald and Robinson,[1] an unfortunate name as the plant is apparently a native of America from whence it became introduced into Europe where it is now a weed.

The above is a brief history of the two Linnaean names. The names for the other species treated in this paper are discussed under each species. The most recent monographer of the group is Small[2] who has proposed several new species for North America. Most of these new species the present writer has been unable to retain. There seem to be only a few specific types, but these are highly variable being made up of races which differ only in minor and apparently inconstant details, and between which are frequent intergradations. Variation is greatest in vegetative characters, and is occasionally so great that at first glance, the extremes may be mistaken for distinct species. Most of the variation in stature and foliage is without doubt due to environment, including soil conditions. It is very possible that the variations in pubescence are due to the same factor. In *O. europaea* the villous and strigose pubescence of stems and pedicels very likely respond to environment, but the hairs on the upper leaf surface seem more racial, with a tendency toward a definite geographical range and without transitional stages. The extent to which species are segregated in this paper into subordinate groups may appear to many as not adding to general utility, but it will give a better picture of the actual taxonomic conditions within this section of the genus Oxalis.

Small has placed much stress on the pubescence of the longer filaments. This character however does not seem to accord with other characters. The number of hairs also may be as low as two or even one, thus showing transition to glabrous forms. The filaments of some 150 specimens of *O. europaea* were examined by the writer with the result that in the form here considered typical *O. europaea* 14 of the western specimens had hairy and 8 glabrous filaments, while in 5 of the eastern the filaments were hairy as against 19 in which they were glabrous. The hairy filaments in this species are much more common in the region of Missouri and Illinois irrespective of the varieties and forms into which the species is divided. In other species the condition of the filaments was in most cases as stated by Small, but in several species there were frequent exceptions. In the heterogamic species a tendency for more hairy filaments in the short styled flowers was observed, but the observation was not verified. Seeds in Oxalis have not furnished many valuable taxonomic characters. A slight variation in size occurs between the seeds of some of the species, and also some difference in intensity and regularity of the markings, but the latter at least are generally not definite enough to be of value.

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[1] Gray Herb. Exsicc. no. 227.

Fl. S. e. U. S. 666 (1903), and N. A. Flora, xxv. 49 (1907).

In the large flowered species a trimorphic condition of the stamens and styles is found (heterogamy). This condition was apparently first noted by Hildebrand,[1] and the biological relations worked out in an excellent series of papers. The phenomenon was also noted by Darwin[2] in his studies of heteromorphism in flowers. Later Trelease[3] and his students gave attention to the matter in a number of papers. The heterogamic condition has not been definitely detected in any of the small flowered species though the occurrence of long and short styled specimens of *O. filipes* and *O. florida* suggests that these two species may be heterogamic.

The present study is a result of difficulty in identifying specimens of Oxalis obtained in central New York. It is based chiefly on specimens in the Gray Herbarium, the New England Botanical Club and the herbarium of Cornell University. The study, though reasonably complete for northern and western North America is incomplete and only provisional as far as the southern United States, Mexico and the West Indies are concerned. The available material from these last named regions was insufficient.

a. Flowers ~~5~~4–11 mm. long, apparently homogamous, or doubtfully so in Nos. 5 and 6; habit, stipules and pedicels various.
  b. Tap-root stout, thick, woody; plants loosely cespitose; rootstocks wanting; seeds 1.2–1.6 mm. long.
    c. Styles 2.5–3.5 mm. long; sepals 4–7 mm. long; peduncles (25) 30–95 mm. long, slender and wiry as are also the petioles; leaflets usually thin; stipules narrow or almost obsolete; seeds 1.5–1.6 mm. long.
      d. Leaflets hairy on the upper surface..............1. *O. californica*.
      d. Leaflets glabrous on the upper surface............var. *subglabra*.
    c. Styles 1–2.5 mm. long; sepals 3–5 mm. long; peduncles

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[1] Monatsber. könig＿. preuss. Akad. Wiss. Berlin. 352 (1866), also Bot. Zeit. xxix. 415 (1871), and lxv. 17 (1887). Lebensverhältnisse der Oxalis Arten, Jena (1884).

[2] Dif. Forms of Fls. in Plants of same sp. (1877).

[3] Trans. Acad. Sci. St. Louis, v. 274 (1886) and 286 (1888). Mem. Bost. Soc. Nat. Hist. iv. 94 (1888).

10–40 (70) mm. long; stipules usually broad, rarely reduced; leaflets thickish.

d. Pubescence of stem and petioles appressed or subappressed; leaflets glabrous above; seeds 1.4–1.6 mm. long...................................2. *O. Wrightii.*

d. Pubescence spreading; seeds 1.2–1.5 mm. long.

e. Leaflets glabrous on upper surface..............var. *subpilosa.*

e. Leaflets hairy on upper surface..................var. *pilosa.*

b. Tap-root slender or wanting; plant often with running rootstocks; seeds 1.0–1.8 mm. long.

c. Stems (not rootstocks) creeping, generally brownish, from slender roots; stipules usually broad and brownish or purplish, subscarious.

d. Pubescence of stem and petioles more or less spreading.

e. Hairs of the capsule fine and dense, not viscid...3. *O. corniculata.*

e. Hairs of the capsule or some of them looser and more or less viscid...........................var. *viscidula.*

d. Pubescence strigose or substrigose; leaves numerous and petioles longer, very slender, giving a twiggy effect.......................................var. *Langloisii.*

c. Stems not truly creeping, erect or decumbent, often with creeping rootstocks; umbels and seeds various; stipules oblong, narrowly oblong or obsolete.

d. Flowers umbellate or solitary, rarely subcymose in No. 5 and No. 6; fruiting pedicels usually horizontal or deflexed but the capsules erect; plants with or without creeping rootstocks; hairs of the capsule, if any, fine and dense, substrigose (at least toward apex, sometimes glabrous below) or with additional villous viscid hairs.

e. Pubescence appressed or subappressed, whitish; capsules abruptly pointed, 8–25 mm. long; sepals 2–7 mm. long; styles usually short.

f. Capsules crisp-hairy and hoary throughout, (10) 15–25 mm. long; sepals (3.5) 4–7 mm. long; plants mostly rather stout, rarely with rootstocks or stolons.

g. Pubescence of the capsule with some loose subvillous viscid hairs.....................4. *O. stricta.*

g. Pubescence of the capsule appressed, nonviscid.................................var. *piletocarpa.*

f. Capsule crisp-hairy or strigose toward the apex, otherwise glabrous, 8–12 mm. long; sepals 2.5–4.5 mm. long; plants very slender and wiry, often with creeping rootstocks...........5. *O. filipes.*

e. Pubescence toward base of stem loosely crisped, tawny; capsules strigose toward apex, glabrous below, rarely strigose throughout, 9–15 mm. long, gradually pointed; sepals 4–4.5 mm. long; styles generally long and slender, less commonly short; plants with rootstocks.

f. Leaflets glabrous above.........................6. *O. florida.*

f. Leaflets hairy on upper surface.................f. *strigosifolia.*

d. Flowers cymose on well-developed plants; fruiting pedicels spreading or ascending; stipules nearly obsolete; plants producing long slender horizontal rhizomes; capsules conical or conic-oblong, with scattered spreading viscid hairs or glabrate.

e. Upper surface of the leaves glabrous.
f. Hairs of the pedicels appressed, scarcely viscid.
g. Stem with ascending pubescence or glabrate . . . 7. *O. europaea.*
g. Stem villous . . . . f. *pilosella.*
f. Hairs of the pedicels spreading, usually viscid.
g. Stems nearly or quite glabrous . . . . f. *cymosa*
g. Stem villous . . . . f. *villicaulis.*
e. Upper surface of the leaves with scattered hairs.
f. Hairs of the pedicels appressed, scarcely viscid.
g. Stems villous . . . . var. *Bushii.*
g. Stems with ascending pubescence or glabrate . . . f. *subglabrata.*
f. Hairs of the pedicels spreading, usually viscid; stem villous . . . . f. *vestita.*
a. Flowers 12–20 mm. long, apparently trimorphic as to relative length of stamens and styles (heterogamous); plants from creeping rootstocks; stipules small or obsolete; pedicels often widely spreading but not reflexed.
b. Leaflets 20–50 mm. wide, usually with a very narrow purple margin; stems 20–50 cm. high; calyx and capsule sparsely and minutely villous and viscid . . . . 8. *O. grandis.*
b. Leaflets 5–20 (25) mm. wide, without a purple margin; stems 5–18 cm. high; capsule closely puberulent, not viscid; calyx puberulent or villous, usually nonviscid.
c. Peduncles not exceeding the subtending leaves; capsules ovoid, 7–10 mm. long; seeds 2.0–2.4 mm. long; umbels 1–2-flowered; leaflets rather large and thin, 10–20 mm. broad, with scattered hairs on both surfaces . . . . 9. *O. Suksdorfii.*
c. Peduncles exceeding the subtending leaves; capsules cylindrical, 10–20 mm. long; seeds 1.4–1.5 mm. long; umbels 2–7-flowered; leaflets 11 mm. broad or less.
d. Peduncles conspicuously exceeding the leaves; stems rather strictly erect from the rootstocks.
e. Pubescence of pedicels appressed; corolla glabrous; leaflets usually glabrous on upper surface.
f. Hairs on the stem spreading . . . . 10. *O. recurva.*
f. Hairs on the stem ascending or appressed . . . . var. *texana.*
e. Pubescence of pedicels and stem spreading, that of the latter shaggy; corolla more or less hairy outside.
f. Leaflets glabrous above . . . . var. *macrantha.*
f. Leaflets hairy on both surfaces . . . . f. *sericea.*
d. Peduncles slightly exceeding the leaves; rootstocks less evident and stems more diffuse at base . . . . var. *floridana.*

1. O. californica (Abrams) Knuth, Notizbl. kön. bot. Gart. u. Mus. vii. 300 (1919). *Xanthoxalis californica* Abrams, Bull. Torr. Bot. Club, xxxiv. 264 (1907), and Small, N. A. Flora, xxv. 54 (1907).—Stems decumbent, sparingly pubescent with subappressed hairs or glabrate; petioles slender 3–8 cm. long, substrigose; leaflets 10–17 mm. broad, hairy on both faces; peduncles often exceeding the leaves, strigose; umbels usually 2-flowered; pedicels 10–40 mm. long, strigose, spreading, scarcely reflexed; flowers apparently homogamous; petals about 11 mm. long, pale yellow or purplish, glabrous; filaments subglabrous; capsule cylindrical, 10–15 mm. long, closely puberulent,

acuminate.—Dry hillsides: Santa Barbara, California to Lower California and eastward to Coahuila, Mexico. Specimens examined: California: Santa Barbara, *W. N. Suksdorf*, no. 221; Los Angeles, *Hasse;* Monrovia, *A. Eastwood*, no. 4175; San Diego County, *L. Abrams*, no. 3274, and *Clara E. Cummings;* Oceanside, *S. B. Parish*, no. 4442. Lower California: All Saints Bay, *Miss F. E. Fish;* Ensenada, *A. W. Anthony*, no. 184. Mexico: Saltillo, Coahuila, *E. Palmer*, no. 135; Soledad, Coahuila, *Palmer*, no. 134 and 135.

Var. **subglabra** var. nov. Foliolis pagina superiori glabris. Leaflets glabrous on the upper surface. Northern Mexico. Specimens examined: El Taste, Lower California, *T. S. Brandegee:* Chihuahua, *C. G. Pringle*, no. 1204 (Type in Gray Herb.); Nuevo Leon, *C. G. Pringle*, no. 8738.

The long lower petioles and peduncles in this species give a twiggy effect not evident in *O. Wrightii.* Rhod. 28: 67. 1926.

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2. O. Wrightii (Gray) Pl. Wright. i. 27 (1852). ? *O. albicans* HBK. Nov. Gen. et Sp. v. 244 (1822).—Stems decumbent, pubescent with fine ascending or subappressed hairs or glabrate; petioles mostly 1–4 cm. long, loosely strigose; leaflets small or medium, 4–15 mm. wide, pale, glabrous above, hairy or glabrate beneath; peduncles short, about equaling the leaves, loosely strigose; umbels 1–3-flowered; pedicels 5–20 mm. long, widely spreading or slightly deflexed; flowers apparently homogamous; petals about 10 mm. long, yellow or purple, glabrous; filaments subglabrous; capsules cylindrical, 12–20 mm. long, closely puberulent, rather abruptly acute.—Jackson County, Missouri (?), Texas, New Mexico and Arizona, southward to southern Mexico. Some specimens examined: Missouri: Jackson County, 1888, *F. Bush* (identification uncertain). Texas: Fort Davis, *Dr. Girard;* Limpia, *Sutton Hayes*, no. 95. New Mexico: *C. Wright*, no. 907. Arizona: Reed's Ranch, Cave Creek, *J. C. Blumer*, no. 1547. Mexico: Sonora, *G. Thurber*, no. 1079; Zacatecas, *Dr. Coulter*, no. 773 and near Concepcion del Oro, *E. Palmer*, no. 292; Durango, *E. Palmer*, no. 5; San Luis Potosi, *J. G. Schaffner*, no. 761, and *Palmer*, no. 651; Jalisco, near Guadalajara, *Pringle*, no. 11323; Federal District, near Tlalpan, *Pringle*, no. 8523, Eslava, *Pringle*, no. 11942, Tacubaya in Vallée de Mexico, *Bourgeau*, no. 1026; Oaxaca, Telixlahuaca, alt. 6000 ft., *L. C. Smith*, no. 514. see 28: 67. 1926.

osa Nutt. Wieg.

Var. **subpilosa**, var. nov. Ab var. pilosa recedit foliolis pagina superiori glabris. Differs from var. *pilosa* in the glabrous upper surface of the leaves.—Central and north central California. Specimens examined: Fort Bragg, Mendocino County, *A. Eastwood*, no. 1610; east of Napa, *W. N. Suksdorf*, no. 768 (Type in Gray Herb.); Ashland, Sacramento County, *H. Mann;* San Francisco, *J. W. Blankinship;* Nobel near Berkeley, *Suksdorf*, no. 406; near San Bruno, San Mateo County, *Suksdorf*, no. 356; Santa Lucia Mts., Monterey County, 1885, *T. S. Brandegee.*

see vol 28: 67 1926.

as sp.? O. pilosa Nutt.

Var. **pilosa** (Nutt.) comb. nov. *O. pilosa* Nutt. in Torr. & Gray Fl. N. A. i. 212 (1838); Small, Bull. Torr. Bot. Club, xxiii. 457 (1896). ? *O. corniculata* var. ? *micrantha* Trelease, Mem. Bost. Soc. Nat. Hist. iv. 88 (1888) as to California plants. *O. pumila,* in part, Trelease in Gray's Synopt. Fl. i. 366 (1897). *Xanthoxalis pilosa* Small, N. A. Flora xxv. 54 (1907).—Pubescence of the stem spreading; leaflets hairy on both surfaces; seeds 1.2–1.5 mm. long. California, from Sonoma County southward; also in Arizona and northwestern Mexico. Specimens examined: California: south of Healdsburg, Sonoma County, *Heller & Brown,* no. 5237; near Crystal Springs, San Mateo County, *W. N. Suksdorf,* no. 395; Santa Cruz, *C. F. Baker,* no. 1968; Santa Lucia Mountains, Monterey County, *R. A. Plaskett,* no. 35; Pacific Grove, 1903, *Heller;* near Santa Barbara, *A. Eastwood,* no. 180, and *L. Abrams,* no. 4110; near Pala, San Diego County, *S. B. Parish,* no. 4397. Arizona: Lowell, *W. F. Parish,* no. 32; Prescott, *E. Palmer,* no. 54. Mexico: Oputo, Sonora, *C. Lumholtz,* no. 200.

The writer has been unable to find good specific characters to separate *O. Wrightii* and *O. pilosa.* The seeds average somewhat smaller in *O. pilosa,* which fact when combined with the difference in pubescence suggests a real racial difference of greater importance than mere fluctuation in pubescence alone, yet the characters all overlap. The var. *subpilosa* bridges over the differences in pubescence. The name for this species is in some doubt. Humboldt, Bonpland and Kunth described *O. albicans* and *O. verticillata,* both from Mexico. The very full description of *O. albicans* agrees well with the present species except as to the statement "Filamenta . . . longiora puberula" and "styli . . . stamina superantes," to which De Candolle added, "stylis longissimis." Since in the present species the filaments are almost always glabrous and the styles short, and since these are rather fundamental characters in separating *O. Wrightii, O. californica* and other species, the writer has found himself too much in doubt regarding the identity of *O. albicans* to displace the well-known name *O. Wrightii* Gray. The identity of *O. verticillata* cannot be determined without recourse to Humboldt's specimen.

3. O. corniculata L. sp. Pl. 435 (1753), most European authors and Trelease in Mem. Bost. Soc. Nat. Hist. iv. 88 (1888) and Gray's Synopt. Fl. i. 365 (1897). *O. repens* Thunb. Oxal. 16 (1781), and Robinson & Fernald in Gray's Man. ed. 7, 534 (1908). *O. pusilla* Salisb. Trans. Linn. Soc. ii. 243 (1794), not Jacq. Oxal. (1794). *Xanthoxalis corniculata* Small, Fl. S. e. U. S. 667 (1903), and other synonyms. —Stems from a slender tap-root, pubescent with rather loose more or less crisped tawny hairs or glabrate; petioles slender, with spread-

defended by Wilmott
Jour Bot Br F 53: 172 1915
refutes B L Robinson

ing pubescence; leaflets glabrous above or very rarely with a few hairs, sparingly hairy beneath, more or less glaucous and often purplish; umbels 2–several-flowered, rarely 1-flowered; peduncles from shorter than to somewhat longer than the leaves, loosely pubescent; pedicels generally short, 4–15 (20) mm. long, at length deflexed; flowers usually small, homogamous, 4–8 mm. long; calyx 2.5–4 (5.5) mm. long; filaments usually glabrous; mature capsule cylindrical or prismatic, 8–15 (26) mm. long, abruptly acute, evenly and closely puberulent with nonviscid hairs; beak and styles short, 1–3 mm. long; seeds mostly 1.2–1.4, rarely 1.8 mm. long.—Occasional as an introduced weed in and around greenhouses in the eastern and Pacific United States, but apparently common in the warmer regions of the world. Specimens have been examined from the following states and countries: Massachusetts, Connecticut, Pennsylvania, District of Columbia, Oregon, Mexico, Bermuda, Nassau, Cuba, Jamaica, Venezuela, Bolivia, Galapagos Islands, Ascension Island, Teneriffe, Azores, Spain, Italy, France, Germany, Jersey, Afghanistan, northern India, Japan, Isle de Pascale, and Australia.

Var. **viscidula** var. nov. ? *O. herpestica* Schlecht. Linnaea xxvii. 525 (1854). Capsulis subvillosis subviscidis. Capsules with some long villous more or less viscid hairs among the short ones. Habitat and range much as in the typical form, but more common in Asia, the Pacific Islands and Australia than elsewhere; apparently rare in Europe and infrequent in warmer America. Specimens have been seen from the following regions: Maine, Vermont, Massachusetts, Connecticut, New York, Missouri, South Dakota, Oregon, Nassau, St. Vincent, Trinidad, Columbia, St. Helena, northern India, China, Hawaii, Philippines, Australia, and New Zealand. (TYPE in Gray Herb.; Northampton, Massachusetts, 1902, Mrs. E. H. Terry.)

Var. **Langloisii** (Small) comb. nov. *Xanthoxalis Langloisii* Small, Fl. S. e. U. S. 667, 1332 (1903). *Oxalis Langloisii* Fedde in Just's Bot. Jahresb. xxxii. pt. 1. 410 (1905).—Slender with longer very slender and more numerous petioles and usually longer and more filiform pedicels; capsules generally nonviscid. Through the southern United States from the District of Columbia to Texas, and in Cuba. Specimens examined DISTRICT OF COLUMBIA: banks of the Potomac, *F. Peck* (old Gray Herb. specimen). VIRGINIA: Clifton Forge, *E. S. & Mrs. Steele*, no. 1. FLORIDA: Hillsborough County, *A. Fredholm*, no. 6258. OKLAHOMA: Harmon County, *G. W. Stevens*, no. 1077. TEXAS: near Texarkana, *A. A. & E. G. Heller*, no. 4241. CUBA: *C. Wright*, no. 56; Pinar del Rio, *P. Wilson*, no. 9377.

This is the most widely distributed of the species here considered, and in different parts of its range is highly variable. These variations have been described by various authors, sometimes as varieties but more often as species, until the synonymy is very complex. Much of the variation in stature, and in size of the umbel, is due here, as in the other species, to fluctuations in water supply, soil and exposure. In some regions there are large-flowered long-capsuled and large-seeded forms, and these have been introduced into America to the extent of at least one specimen from Connecticut and one from Oregon. In the Pacific Islands and in Australia very delicate plants occur which are evidently affiliated with *O. corniculata* but are not exactly identical with this species as it occurs in Europe and America. Most of the European specimens of *O. corniculata* studied had nonviscid capsules, and therefore this form has been taken as typical. The variation in pubescence of the capsule has not been correlated with environmental changes, and to some extent seems to be geographical. For these reasons the form with villous viscid capsules is here treated as a named variety. The typical form of the species and the var. *viscidula* sometimes resemble the more prostrate forms of *O. stricta*, but the smaller capsules, broader and browner stipules and spreading tawny pubescence of the stem usually render their identification certain.

The var. *Langloisii* does not seem specifically distinct, as transitional specimens occur. This variety closely resembles the more prostrate forms of *O. filipes* but the nonviscid capsules are evenly puberulent throughout. The var. *Langloisii* is less plainly creeping than is the typical form and var. *viscidula*. In the Cuban specimens of var. *Langloisii* the leaves are strigose above and the plants are very slender. More material may show this Cuban form to be a definite variety. In all the specimens of var. *Langloisii* seen by the writer the filaments were glabrous, not hairy as stated by Small. The specimens from Oklahoma and Texas though prostrate appear not to root. More material may show this variety to be a complex.

4. O. STRICTA L. Sp. Pl. 435 (1753), Britton & Brown, Ill. Fl. N. U. S., Robinson & Fernald in Gray's Man. ed. 7, Small, Bull. Torr. Bot. Club, xxiii. 265 (1896). *O. Dillenii* Jacq. Oxal. 28 (1794), DC. Prod. i. 691 (1824). *O. Lyoni* Pursh, Fl. Amer. Sept. i. 322 (1814), Elliott, Sk. Bot. S. C. and Ga. i. 527 (1821). ? *O. furcata* Ell. l. c. *O. Navieri* Jord. in Schultz, Arch. Fl. Fr. et Allem. 310 (1854). *O. corniculata* var. *Dillenii* Trelease in Gray's Synopt. Fl. i. 365 (1897). *Xanthoxalis stricta* Small, Fl. S. e. U. S. 667 (1903), and N. A. Flora.—Plant pale; stems from a slender tap-root, often branched at base, erect or ascending, occasionally decumbent and rooting below; stipules oblong, rather firm and pale, larger on prostrate stems; petioles strigose; leaflets 10–18 mm. wide, glabrous above, glabrous or substrigose beneath; peduncles usually exceeding the leaves, strigose;

umbels 2–3-, rarely 1- or 4-flowered; pedicels 8–25 mm. long, more or less deflexed in fruit, strigose; flowers 7–11 mm. long, homogamous, corolla glabrous; filaments generally glabrous; capsules evenly cylindrical, large, abruptly short pointed, finely puberulent and canescent with some long viscid hairs intermixed; styles short; seeds 1.0–1.3 mm. long, sharply marked. Prince Edward Island to British Columbia, southward to Florida, Texas and Mexico, also in Bermuda; apparently absent from the Pacific Coast States.

Var. **piletocarpa** var. nov. Capsulis dense adpresso-puberulis canescentibus eviscidis. Capsules finely and densely appressed puberulent, canescent, nonviscid.—Prince Edward Island southward to New Jersey, also in Wyoming, and introduced into Europe. Not as common as the typical form on the Coastal Plain or in the Mississippi Valley. (TYPE in Gray Herb., "Old gravel pit," Alstead, New Hampshire, 1901, E. F. Williams.)

This is the only species, exclusive of those with thick roots or creeping stems, in which rootstocks and stolons are not developed. The form with villous hairs on the capsule was taken as typical of the species because the Clayton type came from a region from whence all the specimens seen had villous capsules. Also, *O. Dillenii*, which is generally regarded as a synonym of *O. stricta*, was described as having villous capsules. The identity of *O. Dillenii*, however, is not very clear. A specimen was not seen by Jacquin, the species being based on a description and figure of Dillenius.[1] Both Dillenius' description and figure indicate a villous stem, and as stated above the capsule is represented as villous. Dillenius' description of the capsule was "molli & subincana hirsuta." The figure has a strong resemblance to *O. stricta* as to general appearance, habit, root, umbel and capsules, which latter are shown as long and abruptly pointed as in *O. stricta*. Many early authors recognized these two species as identical. More recent authors, especially in Europe have interpreted *O. Dillenii* as an erect variety of *O. corniculata*.

In the Gray Herbarium there are three specimens of *O. stricta* (all var. *piletocarpa*) from Europe as follows: near Limoges, France, 1868, *F. Schultz*, Herb. norm., no. 841 bis; Venice, Italy, 1909 and 1912, *A. Fiori & A. Beguinot*, no. 1324 and 1324 bis. When and how widely this species was introduced into Europe is not known to the writer. It was evidently growing in the Eltham garden in the time of Dillenius, but seems not to have spread as did *O. europaea*. Our limited knowledge of it may be due to the fact that most European authors have included it in *O. corniculata.* No specimens have been seen by the writer from any other portion of the Old World.

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[1] Hort. Elth. ii. 298, t. 221 (1732).

5. O. FILIPES Small in Britton & Brown's Ill. Fl. N. Sta. and Can. ed. 1. ii. 346 (1897), not of Gray's Man. ed. 7. *Xanthoxalis filipes* Small, F. S. e. U. S. 667 (1903).—Stems erect or decumbent, slender, wiry, sparsely pubescent or glabrate; stipules nearly obsolete; petioles very slender, substrigose; leaflets rather thin, 12 mm. wide or less, glabrous or more or less hairy beneath; peduncles filiform, exceeding the leaves; flower clusters 2–5-flowered, umbellate or subcymose; pedicels 6–15 (22) mm. long, filiform, sparsely strigose; flowers 7–10 mm. long heterogamous (?); corolla glabrous; filaments pubescent or rarely glabrate; capsule evenly cylindrical, abruptly pointed; styles about 2 mm. long, rarely longer; seeds 1.0–1.2 mm. long, usually not all in each capsule developed.—Chiefly in dry sandy soil: Connecticut to Florida, mainly near the coast. Specimens examined: CONNECTICUT: Orange, *E. H. Eames,* no. 60. NEW JERSEY: Ocean County, *A. Gershoy,* no. 400; Fort Lee, 1901, *E. E. Magee.* PENNSYLVANIA: Lancaster County, 1901, *A. A. Heller.* DISTRICT OF COLUMBIA: ?, 1899, *E. S. Steele;* Oakwood Heights, *T. A. Williams.* MARYLAND: Glen Sligo, 1899, *T. A. Williams, W. R. Maxon.* VIRGINIA: near Luray, *E. S. & Mrs. Steele,* no. 120; Fairfax County, *L. F. & F. R. Randolph,* no. 167 (Cornell Herb.). TENNESSEE: Wolf Creek, 1894, *T. H. Kearney.* GEORGIA: Charlton County, *A. H. Wright,* no. 531 (Cornell Herb.). FLORIDA: Indian River, *E. Palmer,* no. 67; Lee County, *A. S. Hitchcock,* no. 35, and *Jeanette P. Standley,* no. 188; Lake County, *G. V. Nash,* no. 118.

O. filipes and *O. florida* have much the appearance of hybrids between *O. europaea* and either *O. stricta* or *O. corniculata,* as no new characters are found in either species. The frequency of their occurrence in the east and absence in the west where the possible parents both occur is against this hypothesis. The styles in both species are either long or short, though in very unequal numbers, suggesting a heteromorphism of the flower.

(*To be continued.*)

THE AMPHIBIOUS GROUP OF POLYGONUM, SUBGENUS PERSICARIA.

E. E. Stanford.

(*Continued from p. 112.*)

II. The American Amphibious Persicarias.

The systematic position of the semi-aquatic or amphibious members of the genus *Polygonum* in America has long been a vexed question. The existence of at least two species, each varying widely in its characters in accordance with its ability to maintain itself in most diverse situations, has been generally recognized. One of these is generally cited as identical with the *P. amphibium* L. of Europe; the other as *P. Muhlenbergii* (Meisn.) Wats. or *P. emersum* (Michx.) Britton. Besides these, the existence of some 45 species less generally recognized has been asserted by Greene, Nieuwland and others.

In advance of the somewhat lengthy discussion necessary to present the point of view in its entirety, and to indicate the trend of the discussion itself, it may be said that the proposition advanced by the portions of this paper dealing with the systemy and floral characters of the amphibious Polygonums is to indicate the existence on this continent of two principal species: one, to be referred to as *P. natans* (Michx.) A. Eaton, much resembling but not identical with the European *P. amphibium* L.; the other as *P. coccineum* Muhl., which in the opinion of the writer is an earlier valid binomial disignation of the plant generally called *P. Muhlenbergii* (Meisn.) Wats. and *P. emersum* (Michx.) Eaton. It has previously[1] been advanced as a conjecture supported by a certain amount of presumptive evidence that the great variability manifested by these plants, which has caused so much uncertainty as to their positions and identities, is due not only to their unusual adaptability to varied conditions of habitat—factors which certainly play no small part in the situation—but also, in some sections of the country at least, to more or less frequent cross-breeding between two species closely related and, as compared with the majority of their congeners, unusually adapted to cross-fertilization; the results of these crossings being seen in individuals in which the parental characters are more or less blended, and which have a faculty less strongly developed in other groups of the genus of perennating to a practically unlimited extent by means of rhizomes and rhizomatic stems, while their flowers show a percentage of sterility which is almost unique among the well recognized species of *Polygonum*. Inasmuch as the final proof of this conjecture may be considered to require further studies which are beyond the scope of the present paper, it is not proposed, on the basis of that speculation, to change the rank or nomenclature of any member of the group which has recognizably distinct characters and demonstrated range. As to the existence of *P. amphibium* on American shores, it may be said that a single Nova Scotian specimen in the Gray Herbarium shows the existence of a colony (doubtless introduced) in that province, and it is not improbable that if collectors take cognizance of the characters by which *P. amphibium* may be differentiated, other stations may be discovered. For that reason, as well as the necessity of establishing the position of *P. natans* in American *Polygonum* history, some attention will be devoted to the European species in the discussion which follows.

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[1] Stanford, Rhodora, xxvii. 81–89 (1925).

In view of the great variability, whatever its cause, existing in these plants, it is no wonder that the accounts of the early American floristic writers are, in their brevity, often unsatisfactory, or that these writers themselves occasionally used a term applicable to one species to designate the other. The following resumé is not intended to be encyclopedic, but merely to indicate the points of view of the principal writers who have described these plants and to trace as far as possible the identity of the material to which reference was made.

Walter[1] notes as "P. Bistorta?" a plant which Pursh[2] and Meisner,[3] the former doubtfully, refer to that here treated as *P. coccineum*. The "floribus albis" of Walter appears rather a serious discrepancy; Elliott in 1817 referred Walter's problematical plant to *P. virginianum* L.; this, in view of the white flowers and the territory covered by Walter's work, seems a more probable conjecture. Michaux[4] under *P. amphibium* L. described

"Var. α. *natans:* foliis natantibus, oblongo-ovalibus:
spica ovoidea, glabra.
—β. *emersum:* foliis ovali-lanceolatis, erectis, minutim
pubentibus: spica oblonga.

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[1] Walter, Fl. Carol. 131 (1788).

[2] Pursh, Fl. Am. Sept. i. 271 (1814).

[3] Meisn. Mon. Gen. Polyg. Prodr. 67 (1826) and in DC. Prodr. xiv. 116 (1856).

[4] Michx. Fl. Bor.-Am. i. 240 (1803).

Hab. *α*. in lacu *S. Joannis.*
β. ad ripas fluminis *Ohio.*"

Here we have succintly the typical form of each of the two principal American species: *P. natans* (Michx.) Eaton, with its floating glabrous leaves and short panicles, and *P. coccineum* Muhl., with pubescent lanceolate leaves and longer panicles.

Willdenow[1] as a footnote under *P. amphibium* L. inserted the following:

"Similis species in America boreali etiam amphibia occurrit.
POLYGONUM *coccineum.*
P. floribus pentandris semidigynis, spica cylindracea, ochreis truncatis glabris, foliis ovatis.
Polygonum coccineum *Mühlenberg in litt.*
α. aquaticum foliis ovato-ellipticis obtusis.
β. terrestre foliis ovato-oblongis acuminatis.
Habitat in Pennsylvania. ♃.
Folia varietatis terrestris tripollicaria et sesqui pollices fere lata. *Spica* coccinea bipollicaris cylindrica."

Polygonum coccineum Muhl., then, is to be considered the first published binomial, and therefore valid for the plant with ovate-lanceolate leaves and cylindric panicle, later reduced by Meisner[2] to *P. amphibium* var. *Muhlenbergii,* raised again to specific rank by Watson.[3] For this plant also Michaux's varietal name was combined as *P. emersum* by Britton.[4]

The "var. *α natans*" of Michaux resembles very closely the aquatic form of the *P. amphibium* of Europe, and by most authors has been considered identical with it. Amos Eaton[5] published

"*Polygonum natans* (floating knotweed. Whiting's Pond. r. Au. ♃.) stamens 5: styles 2, or half 2-cleft: leaves lanceolate, glabrous, near the tops of the stem; petiole filiform, half as long as the leaf: stipules not ciliate: peduncle of the spike smooth: stem very long, lax, filiform, submersed-floating, leafless under water and rooting. Stems generally brown, often 10 to 15 feet in length and from the eighth to the sixteenth part of an inch in diameter; though generally larger and not so long. It is the P. amphibium. Var natans of Mx. and a variety of the coccineum of Willdenow. But it appears sufficiently distinct for a species. It grows plentifully in Whiting's Pond 5 miles south of New-Lebanon springs [N. Y.]."

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[1] Willd. Enum. Pl. 428 (1809).
[2] Meisn. in D.C. Prodr. xiv. 166 (1856).
[3] Watson, Proc. Am. Acad. xiv. 295 (1879).
[4] Britton, Trans. N. Y. Acad. Sci. viii. 73 (1889).
[5] Eaton, Man. ed. 3: 400 (1822).

This description appears unchanged in Eaton's 4th edition (1824). In the 5th (1829) Eaton for the first time admitted:

"*amphibium* L. . . . upper leaves sub-sessile and tapering to the base; middle ones short-petioled and abrupt at the base, lance-oblong and ovate-oblong, gradually tapering to a long-acuminate apex, rough at the edge: spike cylindrical: stem thick, erect, sub-decumbent at the base. Flowers large, red, in a thick spike 2 to 3 inches long. In mud and moist ground."

P. coccineum, which had been accorded a very brief mention in the three previous editions, is next described more fully:

" . . . leaves long-petioled, oblong, abrupt and subcordate at the base, acute at the apex, glabrous and lucid; spike cylindrical; stem thick and strong, decumbent and rooting. Flowers red, in spikes not so long or so thick as the last. Stem creeps along the muddy banks of an island in the Hudson, above Troy, from 6 to 12 feet."

The former *P. natans* next appears as *P. fluitans,* with the description recast:

" . . . leaves long-petioled, oblong-oval, tapering to the base, obtuse and acute at the apex, glabrous and lucid: stem filiform, wiry, floating, sometimes rooting: spike cylindric. Flowers red, in spikes less than half as long as the last, and not a fourth as large as the preceding. Stem 10 to 15 feet long, often dark brown and sending off rootlets in clear water. Grows in Whiting's Pond, Columbia County, and in Botany Pond, three miles east of Albany. I have watched this and the two preceding species several years, and am satisfied, they are distinct. Finding this to be a new one, not var. *natans* of Mx. I give it a new name."

The three are further differentiated by the terms: "mud knotweed," "creeping knotweed," and "swimming knotweed." From footnotes we further learn that Eaton considered "*P. amphibium*" to be "var. terrestre T. (orr)"; his "P. coccineum" as "amphibium, Var. natans Mx." and the rechristened "*P. fluitans*" as "amphibium, Var. natans, 3d. ed. Manual and Var. aquaticum T." The remainder of Eaton's works, including the 8th edition (the "North American Botany," of Eaton and Wright) present the same views. Eaton's "*P. amphibium*" is evidently a vigorous example of the variable *P. coccineum.* To one who has devoted any considerable time to this group of plants, it will not appear remarkable that Eaton became somewhat confused about them; the wonder, if any, is that he made no more species. The fact remains that, in the third edition of his Manual, in 1822, he published a binomial to which the North American analogue of *P. amphibium* L. can be referred. "*P. fluitans,*" later taken up by Greene as one of his numerous "species" cannot be held a valid designation.

Among other early American writers Torrey[1] listed *P. amphibium α terrestre* (*P. amphibium β. emersum* Michx. as syn.) and *β. aquaticum* (*P. amphibium α natans* Michx. and *P. natans* Eaton as syns.). As to the *α terrestre,* he states:

"The *P. amphibium* of this country is considered as a distinct species from the European plant by *Willdenow* and some other authors, but I am unable to discover any essential difference between them, except in the latter the leaves (of the var α) are scabrous."

As to the *β. aquaticum:*

"This can hardly be considered a distinct species, as it is sometimes found passing into the variety α. The European plant appears identical with ours."

Bigelow[2] described what is evidently *P. coccineum* Muhl. as *P. amphibium:*

" . . . leaves oblong-lanceolate, acute, rough at the edge; spike cylindrical . . . .
Distinct from the following species [*Polygonum coccineum* Willd.] by its leaves, which are generally lanceolate, though sometimes rounded at the base, the edges ciliate-serrulate, so as to feel rough, the veins having also sometimes the same character . . . .
It agrees perfectly with European specimens."

Under *P. coccineum* Willd. (*P. amphibium α natans* Michx. as syn.) he writes:

" . . . a more perfectly aquatic species than the last, better distinguished from it by the entire smoothness of its leaves than by the characters usually given . . ."

The treatment in Bigelow's third edition (1840) is a repetition. Gray, in the first edition of his Manual (1848) reduced "P. coccineum *Bigel.*" and "P. fluitans *Eaton*" to "**P. amphibium** L. var. 1 AQUATICUM L." and described as "Var. 2. TERRESTRE *Torr.*" a form "More or less hairy or bristly, with an upright or ascending stem . . . the leaves acute or pointed, upper very short-petioled . . . " The range given is "New England to Wis., the var. 1 chiefly northward." "Very variable in foliage, &c.: spike 1′–3′ long, rose red." The description was considerably recast in the fifth edition (1867) with the note that "Var. TERRESTRE Willd., grows in shallow water, or in wet soil, or even 'in sandy prairies' in Illinois (*Dr. Mead*) either almost glabrous or strigose-hirsute, . . "

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[1] Torr. Fl. No. and Mid. U. S. i. 403 (1824).

[2] Bigelow, Fl. Bost. ed. 2: 157 (1824).

Among the early European treatments which mention the American plants Sprengel[1] introduced *P. coccineum* Muhl. into his edition of the Species Plantarum. Meisner[2] listed the aquatic form as *P. amphibium* α *natans* and the other as β *terrestre,* citing in addition to Muhlenberg (in Willdenow) and Pursh the Species Plantarum of Willdenow (1799) (which referred only to the European plant), showing that Meisner then regarded the forms of the two continents as identical. In his later and more extensive work[3] Meisner does not refer to "γ *terrestre*" in America, but proposes as "ε *Muhlenbergii*" the *P. coccineum* Muhl. which he now regards as distinctly American. It is not necessary in the present connection to discuss later European literature.

(To be continued.)

NOTES ON SAGINA

M. L. Fernald

In ordering the material of *Sagina* in the Gray Herbarium it has been found desirable to distinguish two forms which are not ordinarily recognized in America. These may be very briefly noted as follows.

Sagina **micrantha** (Bunge), n. comb. *Spergula micrantha* Bunge in Ledeb. Fl. Alt. ii. 183 (1830). *Sagina Linnaei,* α *micrantha* (Bunge) Fenzl in Ledeb. Fl. Ross. i. 339 (1841). *Sp. semidecandra* Turcz, ex Ledeb. l. c. (1841).

This Asiatic species occurs also on the Aleutian and adjacent islands and the islands of Bering Sea. The following are referred here. Alaska: St. Paul Island, *J. M. Macoun,* nos. 39, 89,644; Attu Island, *J. M. Macoun,* no. 38; Unga Island, *M. W. Harrington.*

no reason for separating this
Hultén, Fl. Kamt. 2: 77. 1928.

S. saginoides (L.) Dalla Torre. The typical plant of the Arctic and of Eurasia has the sepals 2–3 mm. long, the capsules 3.4 mm. long. This extreme occurs southward rather locally to Gaspé Co., Quebec, and in western America to New Mexico and California, but most material of western North America stands apart in having the sepals only 1.3–2 mm. long. This American extreme may be called

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[1] Spreng. Syst. ii. 239 (1825).
[2] Meisn. Mon. Gen. Polyg. Prodr. 67 (1826).
[3] Meisn. in DC. Prodr. xiv. 115 (1856).

S. SAGINOIDES, var. **hesperia**, n. var., sepalis 1.3–2 mm. longis.—The following belong here. ALBERTA: Malique Lake, *S. Brown*, no. 1176; Mt. Temple, Laggan, *Butters & Holway*. MONTANA: near melting snow, head of Cottonwood Creek, Tobacco Root Range, alt. 9000 ft., *Blankinship*. COLORADO: Chambers Lake, alt. 9500 ft., *Crandall*, no. 89 (TYPE in Gray Herb.). IDAHO: near Lolo Divide, *Watson*, no. 58; near Sohons Pass, alt. 1500 m., *Leiberg*, no. 1425. UTAH: Dyer Mine, Uintah Mts., *Goodding*, no. 1346. NEVADA: head of Fall Creek, Ormsby Co., alt. 2460 m., *Baker*, no. 1332. CALIFORNIA: Bear Valley, *Parish*, no. 1491; border of cold spring above Bluff Lake, alt. 8000 ft., San Bernardino Mts., *Parish*, no. 3605; Webber Lake, *Lemmon;* Cloud's Rest, Mariposa Co., *Congdon*. OREGON: Eagle Creek Mts., *Cusick;* along rills at 7000 ft., Powder River Mts., *Piper*, no. 2520. WASHINGTON: Mt. Rainier, *Allen*, no. 51; Cascade Mts., lat. 49°, *Lyall*. BRITISH COLUMBIA: summit of Rocky Mts., alt. 8000 ft., *J. Macoun*, no. 10; Asulkan Valley, alt. 4100–6000 ft., *S. Brown*, no. 581; Fish Creek Valley, alt. 5000 ft., *Butters & Holway*.

GRAY HERBARIUM.

INCONSTANCY IN COLOR-FORMS OF HEPATICA AMERICANA.—In the spring of 1918 I took from the woods and set out in my door-yard four clumps of *Hepatica americana* (*H. triloba* of the Manual; see RHODORA xix. 45, March, 1917). Two bore the blue flowers typical of the species, one had them pink (*f. rhodantha* Fernald), and one white (*f. candida* Fernald). All have flourished; one clump yielded 84 blossoms at a single flowering and has never produced less than about 50. All are still thriving. But of the four only one, the white, has kept the color of its flowers wholly unchanged.

The pink form held its color for one season. Then for four years it came white. Last year (1924) it turned pink again and this year it is still pink, though rather pale. One of the blue-flowered clumps has preserved its color, with some little change of shade, until this spring, when it has suddenly and without transitional stages in previous seasons turned a clear lilac-pink. The flowers of the remaining clump are still blue, though this year very pale.

Dr. A. J. Eames has recorded instances of similar inconstancy in *Viola pedata*, f. *rosea* and in a color-form of *Rudbeckia hirta*. In these cases, however, the variation was in a different direction; his pink-flowered violets reverted to the typical blue and the corresponding reversion occurred in the *Rudbeckia*.

The causes of such inconstancy offer an interesting field for conjecture, or experiment by those equipped to make it. Evidently there is a difference in individuals. My pink-flowered plant was most subject to variation; the white-flowered one not at all. That the pure albino would be constant might, perhaps, be expected. At least, its sepals, tested with hydrochloric acid and ammonia, give absolutely negative reactions; and this, as far as it goes, would seem to indicate the absence in them of any pigment to change. And having, presumably, lost the power to produce pigment, this plant, at least, shows, to date, no tendency to recover it. In the other plants, the altered conditions after transplanting might stimulate physiological change. Moreover, once or twice a year the plants have been given a mulch of leaf-mold. Variations in the quantity of this, or in the degree of its decomposition might conceivably alter the chemical character of the soil sufficiently to induce, in individual plants of inherent physiological instability, changes in the cell-sap great enough to affect the sensitive anthocyan pigments concerned. Dr. Eames considered that weak or pathological conditions were responsible for the color-forms under his observation. If this be the case, variations in the leaf-mold might bring about variations in nutrition which would account for the changes in flower-color here recorded. But my vigorous plants are certainly not obviously weak or pathological; a much feebler appearing plant in another part of the premises has not changed color for five or six years. And horticulturists have been successful in fixing similar color-forms in flowers having anthocyan pigmentation.

In any case, the fact of inconstancy seems worth recording. It is in strong contrast to the behavior of a yellow-flowered *Trillium erectum*, also in my door-yard. Here, where a different kind of pigment is concerned, the flowers have come absolutely true to color for seven and three years respectively. So have some half-dozen plants of the typical form and one intermediate in coloration.—C. A. Weatherby, Gray Herbarium.

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